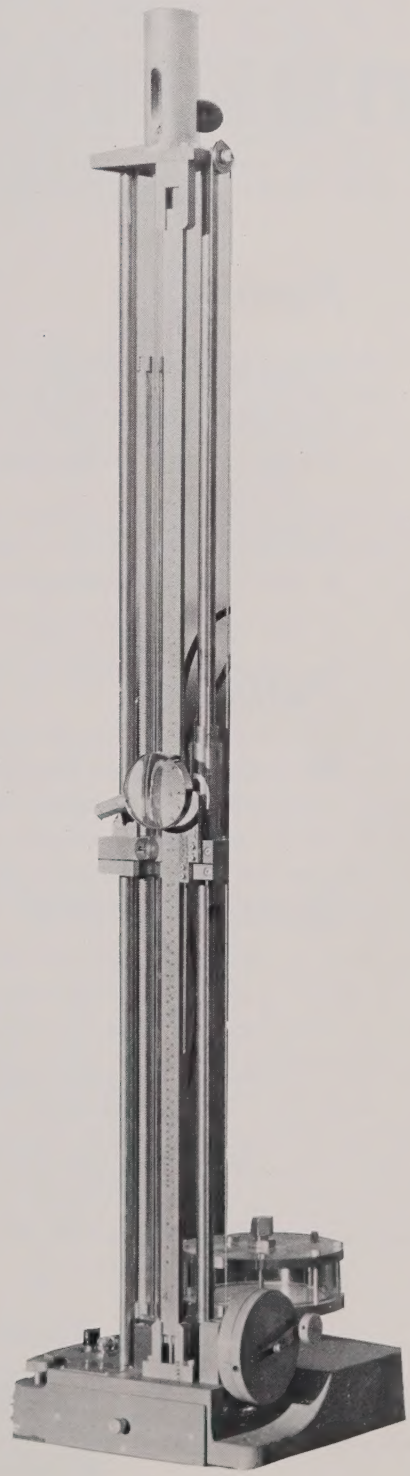
10-14-30

BULLETIN No. 4050-1
September, 1968

IDEAL AEROSMITH
1505 E. FOX FARM ROAD CHEYENNE, WYOMING 82001
Area Code 307 Telephone 634-7714

MERCURIAL ALTITUDE TEST BAROMETER

MODEL 10-A1-31



Description

This instrument is our improved off-set cistern type mercurial barometer.

It may be set for any temperature and gravity conditions within the range of 0° to 40° C and 977 to 982 centimeters / second / second / and automatically corrects for temperature and gravity conditions eliminating the need to apply these corrections to scale readings.

The base is cast aluminum mounted on three adjustable screws for quick and easy leveling. A 6" x 6" tool and parts drawer is a built-in feature. Three steel rods with aluminum cap plate complete the frame.

The cistern assembly is made of stainless steel and pyrex glass. This allows visual check of mercury in the cistern at all times. A sealed "O" ring check valve is used to block the cistern to tube passage when desired.

The cistern manifold is machined from a 1½" block of stainless steel. The pyrex tube is precision drawn having a nominal bore diameter of .631" with a tolerance of ± .0003".

We feel a fairly large tube bore is essential to minimize capillary depression errors found in smaller bore tubes.

A stainless steel needle valve, hand ground to the glass seat, provides a renewable mercury seal at the top of the tube after evacuation.

Dual scanner plates, coupled with our mechanical universal compensator assembly allows settings within the ranges mentioned at the top of this page and makes the automatic corrections.

All settings are easily and quickly made by a double micrometer type adjusting spindle.

A back-lighted magnifying viewer, designed for easy adjustment, gives a clear, unobstructed view of the mercury meniscus either above or below the hairline.

Scanners are positioned and set by means of a two speed, manual crank and cable drive assembly mounted on the base.

(Continued on Back)

DESCRIPTION—(continued)

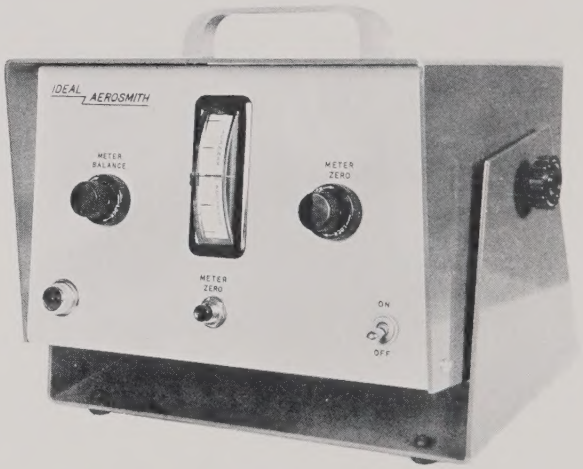
The scales and verniers are made of heavy brass, engine divided and engraved. Scales are laid out in altitude from -1000' to + 80,000' and in mm from 0 to 800 mm. Verniers are readable to .05 mm. Optional scales offer inches of mercury in place of mm and vernier to .001" Hg.

The entire structure, material and finishes of the 10-A1-31 barometer are built to the exacting standards of MIL-B-4308B, U.S.A.F.

The scales on these units are mechanically adjustable to the relative height of the mercury in the cistern, thus making the filling of cistern with mercury a non-critical function of the set-up and zeroing of the barometer.

NOTE: These instruments may also be outfitted with an electronic null meter which allows repeatability of settings to .0005" or better at additional charge.

MODEL 10-A1-31N



Features

- Large bore precision tube.
- Cistern to tube ratio 50:1.
- Precision engine divided brass scales in mm and altitude.
- Universal compensation.
- Manual two speed cable drive.
- May be outfitted with electronic null indicator.

Purpose

For the test and calibration of altimeters, mach indicators, air speed indicator, pressure gages and other types of equipment using pneumatic pressure as a source of operation.

Specifications

Range: — 1000' to + 80,000' alt.
— 0 to 800 mm.

Electrical: 115 V, 60 Cycle A.C.

Size: Base approximately 10½" x 10½"
Overall height — 47"

Overall accuracy: ± .003" Hg with correction card.
± .005" Hg without correction card.

Repeatability: .002" Hg.

Sensitivity: .001" Hg.

Ordering Information

Please state model number, scale engraving if other than standard, electronic null indicator if desired, exact shipping address, preferred carrier and type of shipment. Unless otherwise contracted all shipments are F.O.B. Cheyenne, Wyoming.

IDEAL-AEROSMITH, INC.
1505 East Fox Farm Road Cheyenne Wyoming 82001
Area Code 307 Telephone 634-7714

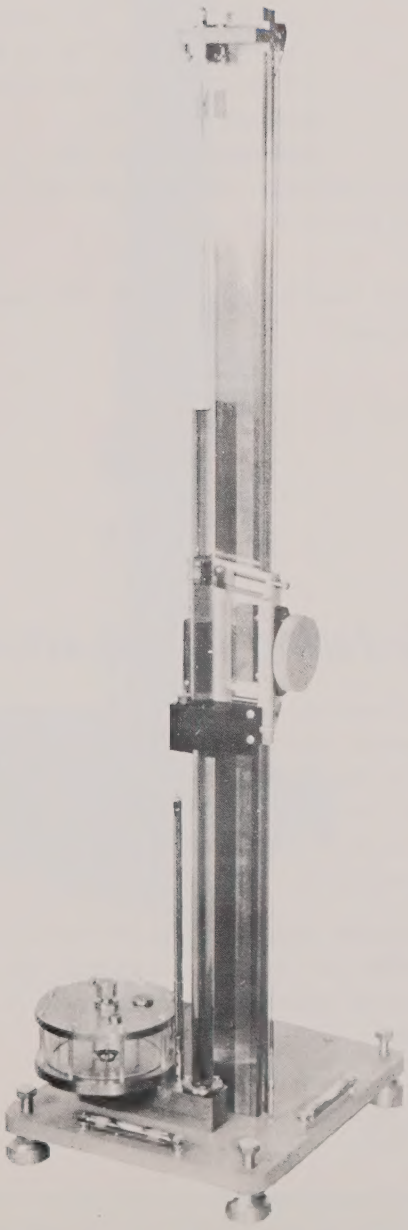
Manufacturers of the new TILT METER, capable of measuring level differences of 0.000001 in/ft.

Bulletin No. 4050-2
Dec., 1971

IDEAL AEROSMITH, INC.

OFF-SET CISTERN MANOMETERS

Manually Operated



Model M-11-32

Purpose

Manually operated manometers provide the most economical form of accurate measurement of absolute and or differential pressures. These instruments fulfill the necessity for a unit which requires low capital outlay, without sacrificing quality construction.

All Ideal> Aerosmith instruments are designed for practical use and therefore are readily adaptable to extraordinary requirements. The standard unit shown is a differential manometer.

Description and Operation

Operation of the unit is by manual adjustment of the scanner to a desired check point on the engraved scale. The operator then adjusts the mercury column to this height, utilizing a good high-vacuum pump and pressure source regulated by sensitive valves and controls. When the column of mercury is balanced at the check point, the operator makes a comparative reading between the direct scale and the instrument being tested.

These manometers are of the off-set cistern type, using precision bore, glass tubes and cistern cylinders. The glass tube used with models designated by "B" preceding the model number are Absolute manometers and have a mercury seal with check needle in upper end of tube. This facilitates not having to constantly evacuate when in operation. The letter "M" prefixing the model number designates a Differential manometer without a mercury seal or check needle. The Differential unit will function as an Absolute manometer when the tube above the mercury column is continuously evacuated.

MODELS

Absolute Manometers:	Differential Manometers:	Ranges:
B-11-32	M-11-32	32" Range
B-11-62	M-11-62	62" Range
B-11-102	M-11-102	102" Range

General Specifications

SCALES—Engraved in all common units of measurement to customer's specifications, including corrections for operating temperature, elevation and latitude of operating station.

POWER SUPPLIES—115 volt AC 50 or 60 cycle current is required. A controlled air pressure of 0-80 P.S.I.G. is required. Vacuum is usually provided by means of a lab-type hivac pump.

SHIPPING WEIGHT*

Model	Without Case	Gross Wt. Packed
32"	85 lbs.	275 lbs.
62"	155 lbs.	400 lbs.
102"	275 lbs.	495 lbs.

*Approximate weight

RANGE—Range is in inches of mercury and is indicated by the last group of figures in the model number; e.g. Model B-11-32 has a 32" range.

ACCURACY—

As manufactured*

± .005" for 32" Hg. range
± .0075" for 62" Hg. range
± .013" for 102" Hg. range

Sensitivity —.001" Hg.

Repeatability — .002" Hg.

*With calibration corrections applied; overall accuracy is ± .002".

TUBE—Precision bore with a .631" inside diameter.

CISTERN ASSY.—Stainless steel construction with Hg blocking valve and precision glass cylinder.

Accessories

•Temperature controlled case—available on all models (add "C" prefix to model number. •Extra scales engraved with units of measurement other than single linear layout. •Electronic pressure limit control. •Null indicator (add "N" prefix to model number). •Magnifying reader glass and illuminating light. •Stop-bar assembly. •Universal temperature and gravity compensator (add "G" prefix to model number).

Ordering Information

When ordering, please specify: Model number; accessories desired; exact shipping address; type of transportation desired and carrier preferred. Unless otherwise contracted, all prices are F.O.B. shipping point and do not include any accessories.

Information Required for Scale Calculations: Elevation and latitude of operating station; scale units desired, and operating temp, if applicable.

Bulletin No. 4050-3
Dec., 1971

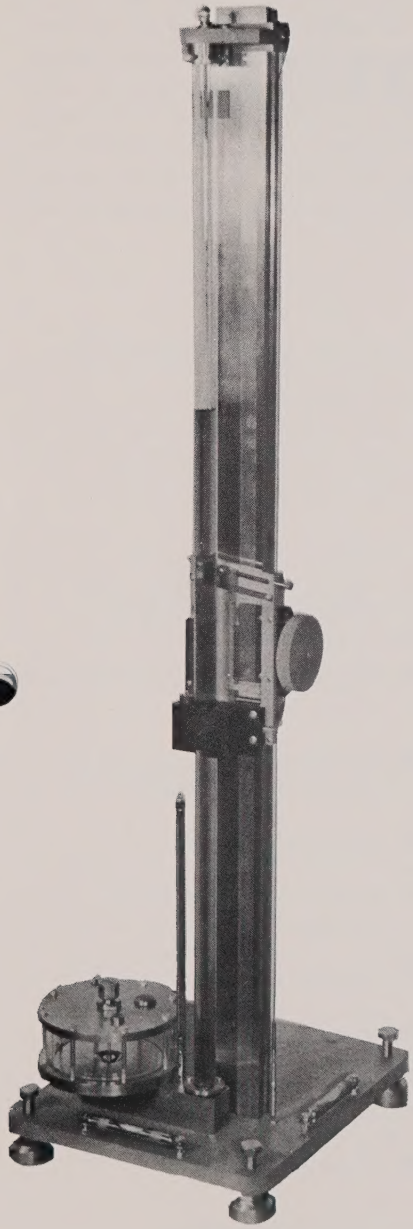
IDEAL AEROSMITH, INC.

TWX 634-1924 Area Code 307 Telephone 634-7714

1505 East Fox Farm Road Cheyenne, Wyoming 82001

MANOMETER

PRESSURE-CONTROLLER



Basic Unit
Model M-17-32

Purpose

Extremely accurate control of ABSOLUTE and/or DIFFERENTIAL pressures to predetermined check points is provided by these refined Ideal>Aerosmith instruments. This model has been specifically engineered to fulfill the requirements of modern industry and is fully adaptable for use in both research and production applications. They are germane in the calibration of such instruments as Air Data computers; transducers; force-balance system components; altitude controllers and switches; sensitive or true airspeed indicators and transmitters; Mach-meter indicators, etc.

Features

SIMPLE..... Command response Servo control system, independent from the skill of operator.

Completely automatic after initial setting of test point desired.

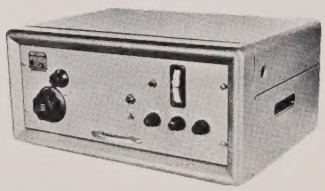
Operator fatigue eliminated with stop bar accessory.

Null meter on control unit signifies when set pressure has been achieved.

RELIABLE..... Faster and more positive operation with the new precision ground "Vee-Way" frame.

RUGGED..... Rigid construction and easy service-ability.

PRECISE..... Used as master-controller in instrument testing.



Servo Valve and Amplifier

Ordering Information

When ordering, please specify: Model number; accessories desired; exact shipping address; type of transportation to be used and the carrier preferred. Information required for scale calculations . . . gravity of operating station (either Potsdam or Absolute) or elevation and latitude of operating station; scale units desired; and operating temperature.

Description and Operation

The Ideal Pressure-Controller Manometer consists of an off-set cistern manometer mounted on the new, precision ground "Vee-Way" frame; a long span scanner assembly; solid state amplifier and a Servo-controlled dual needle valve. Instruments to be tested for calibration are attached to the pressure line or system and the desired pressure settings is obtained swiftly and accurately thru a two-speed crank. A fast adjustment is made to a rough setting; minute accuracy is gained thru a vernier drive in the same crank with no loss of motion. Once the setting is made, the Pressure-Controller Manometer will maintain it indefinitely. A change of less than .0005 inches in the height of the mercury column will disturb the balance of the "balanced-bridge" circuit. Correction is made immediately, thru the Command-directional Servo-valve system. Pressure is added or subtracted from the system to bring the mercury column to the desired check point. The desired setting is maintained automatically and precisely for as long as may be desired.

Specifications

- TUBE: Precision bore with .631±.0003 inside dia.
- CISTERN ASSY: Stainless steel construction with mercury blocking valve and precision glass cylinder.
- SCALES: Engraved in all common units of measurement to customer's specifications. Scales engraved in other than single linear layout are available when specified.
- RANGES: 32", 62" and 102" of mercury are std. The range is indicated by the last group of figures in the model no.; e.g.—Model M-17-32 has a 32" range. This instrument is also available with any combination of two manometers mounted on a common base for dual pressure systems; e.g.—Basic Model M-37-32/62.
- ACCURACY: Measures within its range with a sensitivity of .0001" and has a repeatibility of .002", an over-all accuracy (as manufactured) of ±.005" for models with a 32" range. With applied calibration corrections the over-all accuracy is ±.002 total. ABSOLUTE OR DIFFERENTIAL REF.
- TEMPERATURE CONTROL: Temperatures within the cases are held to a ¼th degree F. variance at any one point and variation will not exceed more than 1 degree in the entire unit, when operated within normal ambient room temperature.
- POWER SUPPLIES: 115 VAC, 60 cycle on standard models. 115 VAC, 50 cycle or 230 VAC, 50 or 60 cycle current can be furnished if specified. A controlled, filtered air pressure of 0 to 80 P.S.I.G. is required. A medium vacuum is required for setup and some operations.

Accessories

- Temperature controlled case and heater assemblies.
- Universal temperature and/or gravity compensator.
- Extra scales.
- Electronic Pressure limit control.
- Stop-bar assembly.
- Vacuum gage.
- Vacuum Pump (laboratory type high vacuum).
- Overflow trap.

IDEAL AEROSMITH, INC.
TWX 634-1924 Area Code 307 Telephone 634-7714
1505 East Fox Farm Road Cheyenne, Wyoming 82001

IDEAL AEROSMITH

AUTOMATIC INDICATING MANOMETER

WITH DIGITAL READOUT

(ABSOLUTE OR DIFFERENTIAL)

Physical Description

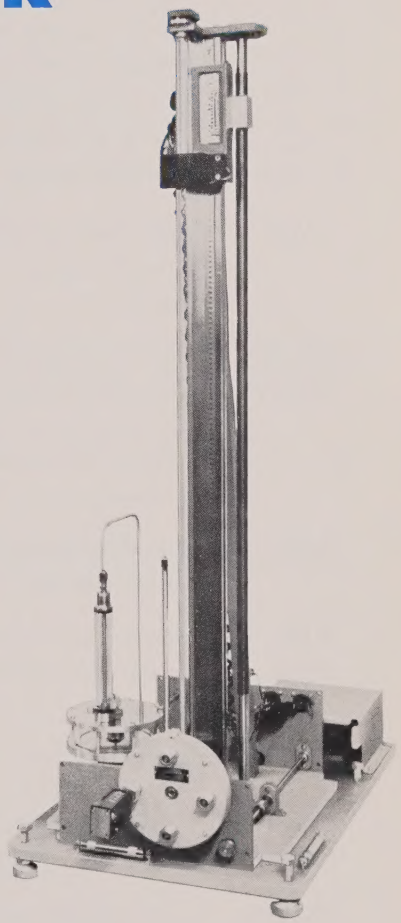
The IDEAL AUTOMATIC INDICATING MANOMETER is considerably faster than a manual manometer, thereby saving man-hours spent in operation. Operator fatigue and eye-strain are completely avoided and reading errors are eliminated.

The AUTOMATIC INDICATING MANOMETER consists of a precision off-set cistern mercurial manometer; photo-electric scanner; solid state amplifier; "Command-response" Servo motor; custom engraved scale and precision ground Vee-way construction. A precision leadscrew is encoded to a digital counter readout.

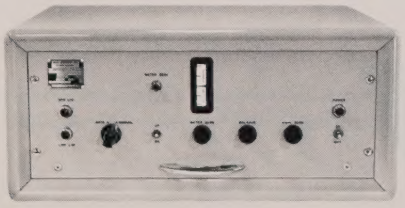
Principle of Operation

A change of pressure in the system causes a corresponding reaction in the height of the mercury. A movement as slight as .0005 inches disturbs the balance of the "balance-bridge" circuit. The manometer immediately begins correction through the Command-directional Servo system. A precision leadscrew drives the scanner in the proper direction until the photo-electric cell light beam is split exactly in half by the crown of the meniscus. At the same time, the rotation of the leadscrew is counted, the resultant pressure is shown on an inline numerical display.

Constant proof of accuracy is provided by quick reference to a custom-engraved scale.



MODEL M-14-32



Electronic System
Control Unit with Null Indicator

Additional Features

- PRECISE
  Designed specifically for the precise automatic measurement of unknown pressures.
- FAST
  Speed and accuracy of measurements are absolutely assured, regardless of the skill of the operator.
- ECONOMICAL
  A practical instrument for research or production that can be modified and adapted to your specific needs.

product specifications

Absolute & Differential
AUTOMATIC INDICATING

General Specifications

ACCURACY: Measures within its range with a sensitivity of ± .0005"; has a repeatability of within .002" and an overall "as manufactured" accuracy of ± .005" for 32" range models, ± .0075 for 62" models and ± .013" for 102" models. A null indicator provides fast, accurate readings.
NOTE: with calibrated corrections applied accuracy is ± .002".

SCALE: Engraved in all common units of measurement to the customer's specifications.

POWER SUPPLY: 115 VAC, 50/60 cycle is required. A controlled, filtered air pressure of 0 to 80 P.S.I.G. is required. A medium vacuum is required for some set-up and operations.

TUBE: Precision bore with a .631 ± .0003" inside diameter.

SLEW RATE: Scanner will follow mercury slew up to 45" per minute maximum.

Models

The Automatic Indicating Manometers are precision off-set cistern type . . . not to be confused with simple manometers designed for less exacting use.

Models are standard in 32, 62 and 102" ranges, with any combination of two ranges mounted on single base if desired.

Accessories

- Temperature controlled case, available on all models. Temperatures are held to a ¼ degree F. variance at any one point, and variation will not exceed more than 1 degree in the entire cabinet when operated within reasonable ambient room temp.
- Universal Compensator . . . automatically adjusts readings to correct for variation in elevation, latitude and temperature.
- Adapter, multiple drive, four outlets.
- Remote readout and recording systems.

Ordering Information

PLEASE SPECIFY: Model number; accessories desired; exact shipping address; type of transportation desired and carrier preferred.

INCLUDE: Information required for scale calculations; elevation, latitude, or absolute gravity of operating station; scale units desired; and operating temperature.

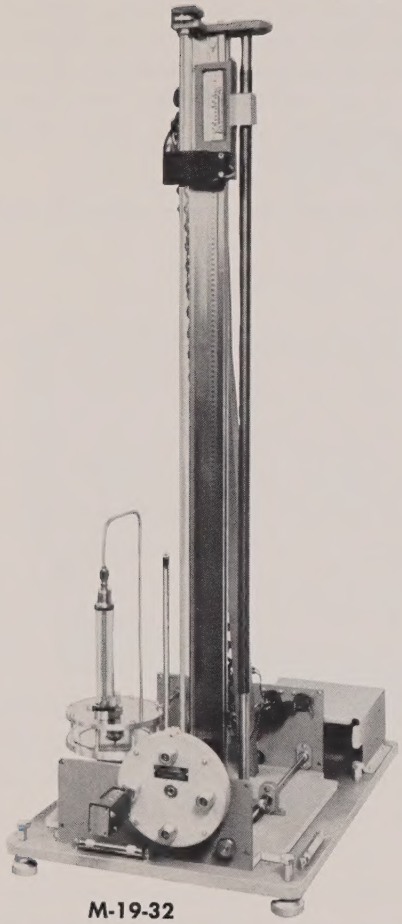
IDEAL-AEROSMITH, INC.
1505 East Fox Farm Road Cheyenne, Wyoming 82001
Area Code 307 Telephone 634-7714

Manufacturers of a full line of instrument test equipment and the NEW Tilt Meter capable of measuring level differences of 0.000001 in/foot.

Bulletin 4050-5
November, 1969

IDEAL AEROSMITH

1505 E. FOX FARM ROAD CHEYENNE, WYOMING 82001
Area Code 307 Telephone 634-7714



M-19-32

MANOMETER

SEMI-AUTOMATIC CONTROLLER

Purpose

The semi-automatic controller is specifically engineered to fulfill the requirements of modern industry for a master-controller in instrument test and calibration. The controller model varies the mercury level to match predetermined check points through a command response Servo control system, independent from the skill of the operator.

Features

RELIABLE—Faster and more positive operation with the null meter on control unit signifying when set pressure has been achieved.

RUGGED—Rigid construction and easy serviceability with the new ground "Vee-Way" frame.

PRECISE—Completely automatic after initial setting of test point desired. Operator fatigue eliminated with electro-mechanical scanner drive.

Accessories

- Temperature controlled case and heater assemblies.
- Universal Compensator . . . . automatically adjusts readings to correct for variations in elevations, latitude and temperature.
- Multiple drive, four outlet Adapter.
- Remote readout and recording systems.
- McLeod gage.
- Overflow traps.
- Laboratory type high vacuum pump.

Ordering Information

When ordering, please specify: Model number; accessories desired; exact shipping address; type of transportation and/or carrier preferred. Information required for scale calculations . . . . gravity of operating station (either Potsdam or Absolute) or elevation and latitude of operating station; scale units desired and operating temperature.

Description and Operation

The Ideal Semi-automatic Controller consists of an off-set cistern manometer mounted in conjunction with a stainless steel "Vee-Way" frame; a long span scanner assembly; solid state amplifier and a Servo-controlled, dual needle valve. A precision ground leadscrew drives the scanner to the desired check point, the rotation of the leadscrew is counted, with the resulting pressure shown on an inline numerical display. A fast trimming adjustment is made manually. Once the adjustment is made, the Pressure-Controller Manometer will maintain the pressure setting as long as desired. A change of less than .0005 inches in the height of the mercury column will disturb the balance of the "balanced-bridge" electrical circuit. Correction is made immediately thru the Command-directional Servo-valve system, by adding or subtracting pressure from the system to bring the mercury column to the desired check point.

Constant proof of accuracy is provided by quick reference between the custom-engraved scale and the digital counter readout.

Specifications

- TUBE: Precision bore with .631 ± .0003 inside diameter.
- CISTERN ASSY: Stainless steel construction with mercury blocking valve and precision glass cylinder.
- SCALES: Engraved in all common units of measurement to customer's specifications.
- RANGES: 32", 62" and 102" mercury columns are standard. The range is indicated by the last group of figures in the model no.; e.g.—Model M-19-32 has a 32" range. This instrument is also available with any combination of two columns mounted on a common base for dual pressure systems; e.g.—Model M-39-32/62 has two columns, a 32" range and 62" range.
- ACCURACY: Measures within its range with a sensitivity of ± .0001"; has a repeatability of within .002" and an overall "as manufactured" accuracy of ± .005 for 32" range models, ± .0075 for 62" models and ± .013 for 102" models. With applied calibration corrections the over-all accuracy is ± .002 total, Absolute or Differential Ref. Controls within .0005 in. hg.
- TEMPERATURE CONTROL: When equipped with a temperature controlled case, the temperature is held to a ¼th degree F. variance at any one point and variation will not exceed more than 1 degree in the entire unit, when operated within normal ambient room temperatures.
- SCANNER TRAVEL: The Scanner has a point to point travel rate of up to 45" per min. max.
- POWER SUPPLIES: 115 VAC, 60 cycle on standard models is required. 115 VAC, 50 cycle or 230 VAC, 50 or 60 cycle current models can be furnished if specified. A controlled, filtered air pressure of 0 to 80 P.S.I.G. is required. A medium vacuum is required for some set-ups and operations.

IDEAL-AEROSMITH, INC.
1505 East Fox Farm Road Cheyenne, Wyoming 82001
Area Code 307 Telephone 634-7714

Manufacturers of the new TILT METER, capable of measuring level differences of 0.000001 in/ft.

NM-2019
April 1971

IDEAL AEROSMITH

NULL METER

PHOTO SCANNING

Part No. 221675

Features

- Reduces operator fatigue
- Increases repeatability of readings
- Insures accuracy without highly skilled operators
- Sensitivity—less than .0005" Hg.

Purpose

The photo electric null meter is designed to be used as an accessory with Ideal-Aerosmith barometers and manometers. It is particularly advantageous in higher range manometers since the operator is not required to visually sight the meniscus at each pressure reading. Units utilizing visual reading means can be modified to incorporate the null meter by the replacement of scanner plates and associated wiring.

Basic General Description

The photo scanning null meter is basically a system composed of a pickup assembly containing a photocell bridge circuit which operates the indicator. The unit incorporates a regulated power supply mounted on a common chassis and housed in a sloping front cabinet. The interconnecting cable is attached to the null meter with a disconnect plug on the manometer. The meter is a center null, pointer type, and indicates scanner position, above or below the mercury meniscus in the glass barometer tube.

General Specifications

Overall Dimensions:
Single Unit—10½" wide x 8" high x 6½" deep.
Dual Unit—12½" wide x 8" high x 6½" deep.

Electrical Requirements:
Operates on 115 Volts, 50 or 60 cycle, A.C. current.

Sensitivity:
Adjustable to a sensitivity of approximately .0002" Hg.

Repeatability:
Within .0005" Hg.

Net Weight:
Single Unit—Approx. 7 pounds.
Dual Unit—Approx. 12 pounds.

Shipping Weight:
Single Unit—Approx. 15 pounds.
Dual Unit—Approx. 20 pounds.

Ordering Information

Specify single or dual unit, delivery desired, type of shipment, Model and Serial Number of unit which is to be equipped, and electrical requirements.

Model or Part Number

Single—221675-1

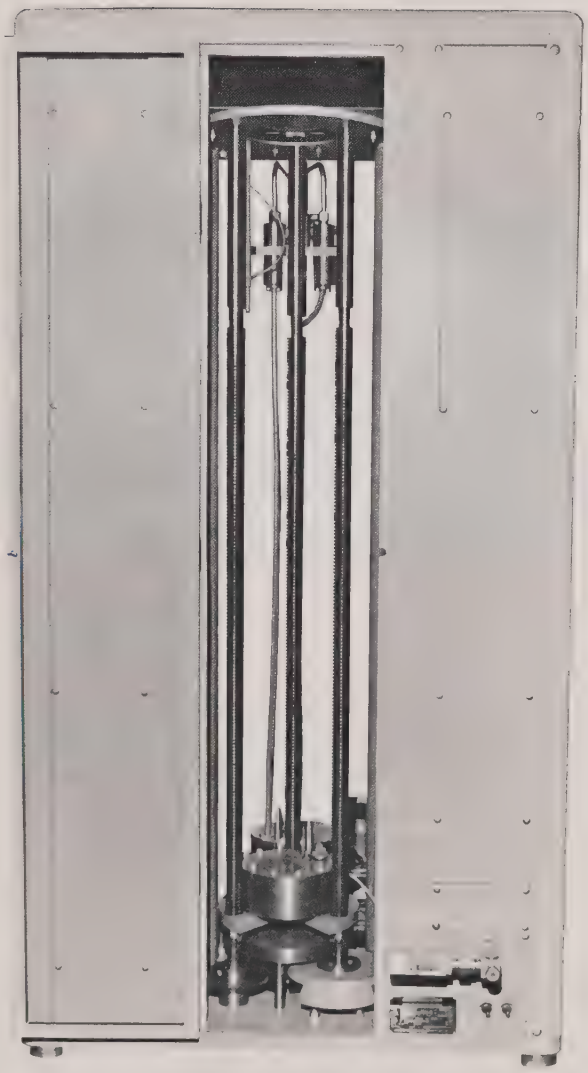
Dual—221675-2

Installation

No special installation requirements need be met, however a platform or base on which the Null Meter is to be positioned, should be in the immediate area of the unit being equipped. On older type units an interface kit may be necessary.

Bulletin No. 4050–DCNM
February, 1972

CAPACITANCE PRIMARY PRESSURE STANDARD



Ideal-Aerosmith offers the Model DCNM-83 Series Dual Cistern Nulling Manometer . . . a versatile new precision instrument that provides the highest accuracy in pressure measurement of any existing laboratory standard. Manual or Automatic.

DCNM Controller under $20,000.00

IDEAL AEROSMITH, INC.
1505 EAST FOX FARM ROAD
CHEYENNE, WYOMING 82001

DCNM-83-32

PHYSICAL DESCRIPTION

The **Ideal-Aerosmith Model DCNM-83 Series Dual Cistern Nulling Manometer** is comprised of two major components . . . the manometer and the indicator.

The manometer is assembled on an aluminum base measuring 30" by 36". This base is fitted with four leveling screws, one in each corner, and two levels. The fixed cistern is mounted on the base. The movable cistern is positioned vertically on three lead screws. Driving power for the movable cistern is furnished by an electric motor and is transmitted through gears to the three precision-ground lead screws. Two precision temperature sensors are included with this unit, one for each cistern. This arrangement gives accurate ambient temperature of the instrument. On the front plate of the manometer are mounted the motor control switch, the trimmer knob, and digital counter. Located just below the movable cistern is a vernier dial. The weight of the 32" manometer is approximately 285 pounds. The indicator is a separate unit connected to the manometer by two shielded electric cables. The metal case encloses a phase sensitive null indicator and indicating meter with their associated electronic and electrical components.

IDEAL-AEROSMITH'S DCNM-83 SERIES DUAL CISTERN NULLING MANOMETER PROVIDES A PRIMARY LABORATORY STANDARD WHICH IS READILY CALIBRATED ON SITE BY COMPARISON TO PRECISION GAUGE BLOCKS.

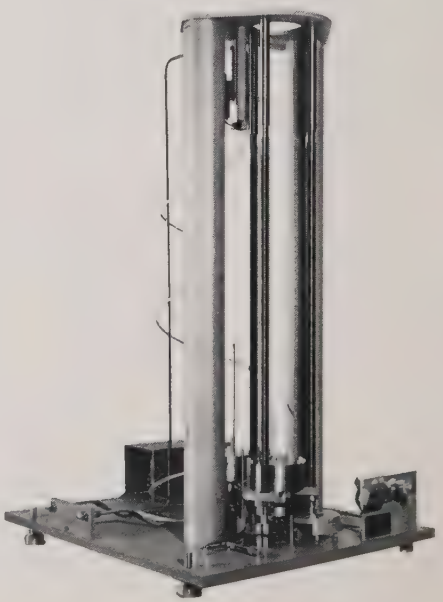
SIMPLICITY OF DESIGN AFFORDS PRECISE PRESSURE READINGS TO BOTH SKILLED OPERATORS AND TO OPERATORS WITH A MINIMUM OF MANOMETER EXPERIENCE'

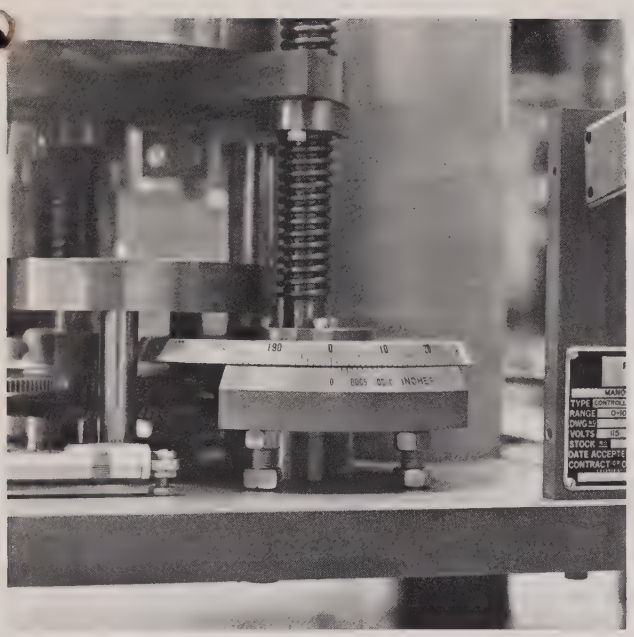
PRINCIPLE OF OPERATION

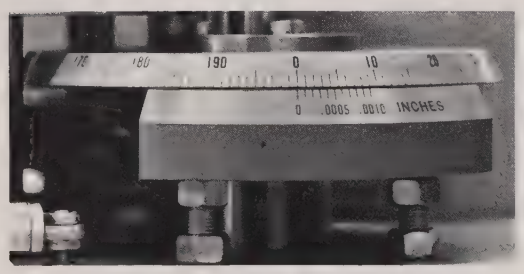
Operation of **Ideal's Model DCNM Manometer** is similar in principle to a conventional U-tube manometer. The primary difference lies in a construction refinement which makes use of a flexible tubing rather than the ordinary rigid glass U-tube. This tubing terminates in two 4½" I.D. cisterns. Capillary depression error is reduced to a negligible factor.

Within each cistern the mercury acts as the variable plate of an electrical capacitor and is insulated from a fixed plate and the guard ring by a thin layer of epoxy resin. The height of the mercury in relation to the fixed plate, acting through a dielectric of air, determines the effective capacitance within the cistern.

A phase comparison between the capacitances within the cisterns is indicated on a meter dial. When the weight of the mercury column between the two cisterns is equal to the applied differential pressure, the meter indicates null. A capacitance bridge circuit and a phase sensitive null meter of high sensitivity will indicate the null position with extreme accuracy.







Vernier Reading

Ranges of 32, 62, and 102 inches of mercury furnished as standard models available with English or Metric leadscrews Vernier as above designed for ease of operator readability.

MODELS:

DCNM-83-RANGE: Motor driven, switch controlled, mechanical digital type read-out. Used for high accuracy measurements and indication of applied pressures only. Includes temperature control case.

DCNM-89-RANGE: Same as -83- above, but with automatic **controller** features. Uses same as for -83- above but has added controller mode portion.

OPERATING PROCEDURE

To measure a differential pressure, connect the sources of pressure to the appropriate fittings labeled Pt (total pressure) and Ps (static pressure).

After applying the desired pressures, coarse vertical positioning of the movable cistern is accomplished by operating the "up-down" switch as required. Fine adjustment is then accomplished by rotating either the "trimmer" knob or the large, knurled "vernier" dial. The differential height (or the difference between the level of mercury in each of the two cisterns) is indicated on a digital readout dial (counter type indicator) to three decimal places, and on the vernier dial to four decimal places. By interpolation the fourth place may be subdivided into quarters. Readings should be taken when the null indicator reads "zero" (0).

Readings obtained will be in the terms of true inches. It will probably be required and/or desirable to correct these readings to terms of the height of the column of mercury at standard conditions of temperature and gravity.

NOTE: Complete operating instructions and correction formulas furnished in tech manual accompanying each instrument.

REPEATABILITY: ± 0.0001 inches Hg or better, under stable environmental conditions.

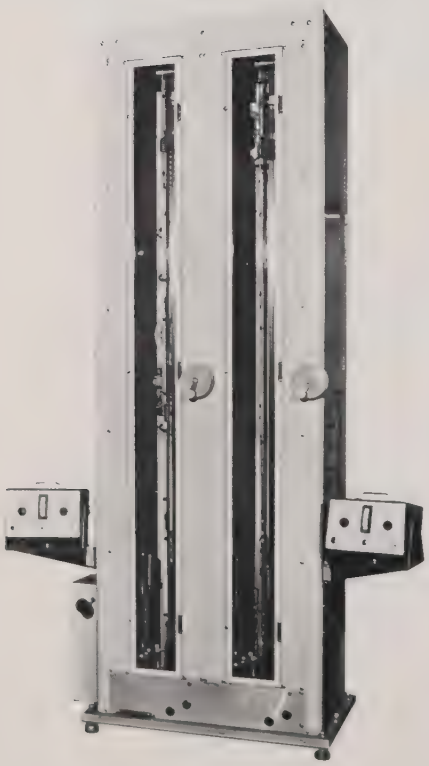
SPECIFICATIONS

ACCURACY:

When using the tilt meter and using the thermometers as temperature sensors in conjunction with the gage blocks, and after making appropriate corrections, the accuracy of the system shall be .001% of Full Range.

When using standard spirit levels and using the thermometers as temperature sensors in conjunction with the gage blocks, and after making appropriate corrections, the accuracy of the system shall be .002% of Full Range.

CONVERSION GEARING: Readings taken from the digital readout assembly can be in terms of "standard pressure." This is accomplished by conversion (correcting) gearing on each standard manometer for **one** particular temperature and **one** particular location; and a temperature control case furnished as an extra cost option. The case is an aid in: eliminating errors caused by differences of temperature; excluding dust and foreign particles from the manometer components; and packaging for shipment. In addition, the temperature **control** case will relieve the operator from making calculations for temperature errors and corrections.



OPTIONS

TILT METER: A tilt meter can be furnished as an extra cost option. This is a highly accurate level which minimizes uncertainties due to out-of-level and perpendicularity.

Accuracy with the above "Direct Reading" shall be .005% of Full Range.

*Sensitivity	.000001" Hg.
Repeatability	.0001" Hg.
Overall Accuracy to	.001% range.

CALIBRATION: Provisions shall be made to permit calibration with gage blocks. These provisions shall include a transducer so that constant block pressure can be applied during measurement. Manometer shall be calibrated prior to shipment and shall be certified that calibration is traceable to the National Bureau of Standards.

*At simulated altitudes over 25000feet.

ASK ABOUT OUR OTHER PRODUCTS

Rate Tables
Offset Cistern Manometers
Scorsby Tables
Valves—Precision Needle
Digital Display
Linear Measuring Systems
Pressure Vacuum Chambers

SUPPLIES AND INSTALLATION

SUPPLIES: Electrical Power, pressure supply, vacuum supplies, all test ports, valves, and external plumbing are to be supplied by the customer. If desired, Ideal-Aerosmith can quote, as extra cost options, vacuum pumps, vacuum gages of electronic thermocouple type, instrument test chambers, sensitive needle valves, pressure-vac valves, and certain plumbing fittings.

Installation Assistance included

Some of Our DCNM Customers

Air Carrier
U. S. Air Force
Bendix
Bell Aerosystems
Boeing
Collins Radio
Conductron
Emerson Electric Co.
General Dynamics
Hughes Aircraft Co.
Lockheed Georgia Co.
McDonnell Douglas
U. S. Navy
NASA
North American Aviation
The Bendix Co.
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Vought Aeronautics Division LTV

IDEAL AEROSMITH, INC.
1505 EAST FOX FARM ROAD
CHEYENNE, WYOMING 82001

TM 2026
April 1971

IDEAL AEROSMITH

TILT METER

DUAL CISTERN

Model DCTM-11

Purpose

The Model DCTM-11, Tilt Meter was designed and developed as a small compact unit, easily adapted to the many and varied uses requiring a high degree of levelness control. The Null Indicator used in conjunction with the Tilt Meter allows the operator to take meter readings of the magnitude and direction of "out-of-level" conditions. With the Tilt Meter installed, shifts of platform level can be constantly monitored and corrections applied as necessary for precise values or for calibration of levels for all types of stable platforms and zero reference tables.

Accuracies and Sensitivities

- Design accuracy of within 0.017 seconds of arc, or LESS THAN 0.5 INCHES TILT IN 100 MILES. (When used with a recorder)
- Null indicator can be adjusted to give a sensitivity FROM 0.06 SEC. of ARC. per division of meter can be interpolated to less.
- Will DETECT CHANGES in angle of LESS THAN 0.01 SECONDS of ARC.
- Completely automatic. Accuracy is independent of the skill of the operator.
- After proper leveling, the sensor unit gain is adjusted to match an exact introduced angle, thus making the tilt meter "self-calibrated."

Installation

No special installation requirements need be met; however, the platform or base on which the tilt meter is positioned should have a mass that will insure the utmost stability. A 115 Volt, 50/60 cycle A.C. power supply is required for the Null Indicator.

Description and Operation

The Model DCTM-11, Tilt Meter, consists of two shallow, inter-connected pools of mercury within the cistern base. An inter-connected air gap of approximately 0.025 inches exists above each pool of mercury. A capacitance plate is rigidly mounted within each cistern top plate. Sensor units mounted in each top plate measures the capacitance phase balance between the two air gaps in the cisterns. The signals, transmitted to the Null Indicator, are visually read on the Null Meter. The Meter can be calibrated to read directly in fraction of a second of arc, deviation from true level. When the Null Meter centers at Zero, the mercury surfaces of the pools of mercury are balanced and at true level. Provided with output jacks for use with a recorder.

CISTERN BASE

A stainless steel base with two 2-½ inch diameter reservoirs for mercury, 9-⅛ inches between centers. The precision machined lapped base provides an accurate reference plane for leveling.

CISTERN TOP PLATE

Encloses the mercury reservoirs; provides for connecting the sensor units and acts as a ground for the electronic circuit.

CISTERN GUARD PLATE

Protects the capacitance circuit from any stray capacitance which may be in the area. The extreme sensitivity of the capacitance bridge requires this protection.

CISTERN CAPACITANCE PLATE

Used to detect or measure the capacitance of the air gap between itself and the surface of the mercury.

NULL INDICATOR

The Null Indicator used with the DCTM-11, Tilt Meter, consists of the following components: (1) Power Supply, (2) Oscillator, (3) Bridge, (4) Bridge Amplifier, (5) Signal Drive, (6) Phase Detector, (7) Reference Driver, (8) Null Amplifier and (9) Null Meter.

Ordering Information

Please state model number, exact shipping address, preferred carrier and type of shipment.

Bulletin No. MV2020
January 1972

IDEAL AEROSMITH, INC.

TWX 634-1924 Area Code 307 Telephone 634-7714

1505 East Fox Farm Road Cheyenne, Wyoming 82001

VALVE-MOMENTARY MANUAL

Model No. 219385-3 Stainless Steel Body
Model No. 219385-5 Aluminum Body

Purpose

The momentary valve has been designed as a replacement for existing screw type needle valves, used in the pneumatic systems of precision mercurial manometers, and other pneumatic systems requiring needle valve adjustment of pressure and vacuum supplies to test installations.

Description

The basic design of this valve is a dual, straight lift, nonrotating needle valve, incorporating spring loaded needles, lifted by means of a pin and yoke arm assembly. The valves are actuated by cams working against the yoke arms. The cam and yoke arms for both pressure and vacuum flow are designed so that the first half of the rotational movement in either direction results in flow for very precise control. Fast flow is initiated by rotating the control knob through the second half of its travel. The control knob and cam shaft for feed of both pressure and vacuum is spring loaded to a center off position. Maximum rotation is approximately 120° each way off center. System bleed valve needle is located in center of control knob for ease of venting.

Features

- One hand, vacuum and pressure control.

  This control has the highly desirable feature of making pressure settings a one handed operation, and can be operated over its full range with no shift of hand position, such as encountered in operating two screw type manual needle valves.

- Trimming, at extremely minute rates.

  Very slight rotational movement creates minute flows; realistically in proportion to displacement. The valve is capable of controlling flow to permit minute pressure changes in a small volume system.

- Stainless steel or aluminum valve body and stainless steel needles, replaceable non-metallic seats.

- Simple direct operation of fully adjustable spring loaded needles, cams, and levers. Needles and seats in this valve are less subject to damage, due to their positive spring loaded stop position, and are not dependent on operators feel for shutoff tightness.

  A safety feature of this valve is the spring loaded, center off control which prevents the valve from being left open, creating overpressuring. Valve is automatically off at any time operator is not manipulating control feed knob.

- Sensitive needle valve for system venting.

  All components of this valve are interchangeable and replaceable, including needles, seats, etc.

Specifications

Size

2" Diameter — 7½ Deep (5" behind panel)

Mounting

Panel Mounting (single hole, 1" dia.)

Weight

2¾ Pounds

Ordering Information

Please state model number, exact shipping address, preferred carrier and type of shipment. Unless otherwise contracted all shipments are F.O.B. Cheyenne, Wyoming.

Model 219385-5 is identical to 21938-3 except the valve body is aluminum instead of stainless steel. All other features are retained

MANOMETER PRICING

MODEL 10-A1-31
Barometer, manual absolute, range 0-31" Hg., dual scale engraved in Altitude -1,000 to +80,000" and 0-800 MM Hg. Includes Universal Temperature and Gravity Compensator, Magnifying reading, and mercury. (FSN 6685-945-4963), (Meets MIL-B-4308B) . . . . . $ 1,800.00

MODEL 10-A1-31
Same as above, but scale engraved in Altitude -1,000 to 150,000' per U.S. Standard Atmosphere, 1962, and 0-31.5" Hg.. . . . . 1,800.00

MODEL 10-A1-31N
Same as 10-A1-31 above, but includes Null Indicator for ease and speed of making settings of better repeatability and taking readings; either scale as shown for 10-A1-31 above. 2,060.00

NOTE: Please specify which type of scale, as listed, is desired (installed in the instruments) i.e. MM.HG & Altitude or IN.HG. & Altitude.

BASIC PRECISION MANUAL MANOMETER FOR LABORATORY OR PRODUCTION

MODEL CB-11-32 or CM-11-32
Manometer, manual, absolute or differential, single linear scale per specification. Range 0-32" Hg. with case. 2,875.00

MODEL CB-11-62 or CM-11-62
Same as above, but range 0-62" Hg. 3,700.00

MODEL CB-11-102 or CM-11-102
Same as above, but range 0-102" Hg 4,650.00

See Bulletin No. 4050-2 for specifications.

OPTIONAL EQUIPMENT AVAILABLE
(See Bulletin 4050-5/73 for pricing) -- Temperature Control Case, Null Indicator, Additional Scales, Universal Temperature and Gravity Compensator, Momentary Valve, Stop Bar Mechanism, and Presssure Control Console.

PRECISION MICROMETER - STANDARD MANUAL MANOMETERS

These manometers are single column, cistern type, manually controlled, and are similar to the manual types above. They are, however, equipped with a precision depth micrometer for measuring the drop of the mercury in the cistern (in true inches), and a single linear scale, accurately engraved in true inches. Because of this feature, they may be used as secondary, or laboratory standard

Replaces all previously published price sheets. Above prices are F.O.B. Cheyenne. Terms are 1/2% - 10 days; net - 30 days. All prices are subject to change without notice.

MANOMETER PRICING (CONTINUED)

type instruments where the greatest accuracy of pressure measurements within their respective range is required. No bulletin available for specifications. Ranges 0-32", 62", & 102" Hg. . . . . P.O.A.

OPTIONAL EQUIPMENT AVAILABLE
(See Bulletin 4050-5/73 for pricing) -- Null Indicator

PRECISION AUTOMATIC INDICATING MANOMETERS

MODEL CB-14-32 or CM-14-32
Manometer, automatic indicating, absolute or differential, single linear scale per specifications. Range 0-32" Hg. Includes Amplifier, Null Indicator, Digital Counter, and Case. . . . . .$ 6,280.00

MODEL CB-14-62 or CM-14-62
Same as above, but range 0-62" Hg. 6,600.00

MODEL CB-14-102 or CM-14-102
Same as above, but range 0-102" Hg 8,500.00

See Bulletin No. 4050-4 for specifications.

OPTIONAL EQUIPMENT AVAILABLE
(See Bulletin 4050-5/73 for pricing)-- Temperature Control Case, Universal Temperature & Gravity Compensator, 2 Outlet Adapter, 4 Outlet Adapter, Remote Readouts (Electrical or Mechanical) and additional scales.

PRECISION PRESSURE CONTROLLER MANOMETERS

MODEL CB-17-32 or CM-17-32
Manometer, controller, absolute or differential, single linear scale per specifications. Range 0-32" Hg. Includes Amplifier, Valve Unit, Null Indicator, and case. 6,265.00

MODEL DB-17-62 or CM-17-62
Same as above, but range of 0-62" Hg 7,097.00

MODEL DB-17-102 or CM-17-102
Same as above, but range of 0-102" Hg. 7,900.00

See Bulletin No. 4050-3 for specifications.

MODEL CM-19-32
Manometer, semi-automatic controller, offset cistern type, complete with precision ground lead screws, servo control, mechanical digital counter, and case 7,300.00

Replaces all previously published price sheets. Above prices are F.O.B. Cheyenne. Terms are 1/2% - 10 days; net - 30 days. All prices are subject to change without notice.

MANOMETER PRICING (CONTINUED)

MODEL CM-19-62
Same as above, but range of 0-62" Hg. . . . . $ 8,250.00

MODEL CM-19-102
Same as above, but range of 0-102: Hg 8,883.00

See Bulletin No. 4050-5 for specifications.

PRECISION STANDARD DUAL CISTERN NULLING MANOMETERS

MODEL DCNM-83-32 (Digital Readout)
Manometer, primary lab standard. Range 0-32" Hg. Includes Motor Driven Lead Screws, Null Indicator, Digital Counter, McLeod Gage, Manual switch, 3 Lead Screws, and Temperature Stabilization case 13,500.00

MODEL DCNM-83-62 (Digital Readout)
Same as above, but range of 0-62" Hg. 14,500.00

MODEL DCNM-83-102 (Digital Readout)
Same as above, but range of 0-102" Hg 15,300.00

See Bulletin No. 4050DCNM for specifications.

Controller, pressure/vacuum for all DCNM 83 Series
Complete valving assembly to convert manual series manometer to controller type. Automatically furnishes pressure and/or vacuum to preset position. Contact factory for more detailed information. Recommend factory installation 4,500.00

MODEL DCTM-11
Tilt Meter with Null Meter (See Bulletin No. TM-2026) 2,890.00

See "Story of Precision" for technical description for all DCNM-83 Units.

PRICES ON DCNM INCLUDE TWO CONSECUTIVE DAYS OF TECHNICAL SERVICES BY FACTORY REPRESENTATIVE.

PRESSURE CONTROLLER FOR TESTING OF DUAL PRESSURE SYSTEMS SUCH AS AIR SPEED INDICATORS

MODEL 1070-D
Manometer, 3-column absolute and differential combined, single case. Each column is equipped with a Servo Valve, Null Meter, and Temperature and Gravity Compensator. Includes setup. 18,000.00

Replaces all previously published price sheets. Above prices are F.O.B. Cheyenne. Terms are 1/2% - 10 days; net - 30 days. All prices are subject to change without notice.

OPTIONAL EQUIPMENT FOR MANOMETERS

The following standard accessories are available for use with absolute and differential manometers. Only identifying descriptions are given in this price list.

	PURCHASED SEPARATELY	INSTALLED
Temperature Control Case, 32" Single	$ 800.00	$ 875.00
Temperature Control Case, 32" Dual	935.00	1,010.00
Temperature Control Case, 62" Single	1,185.00	1,260.00
Temperature Control Case 62" Dual.	1,525.00	1,600.00
Temperature Control Case 102" Single	1,380.00	1,455.00
Temperature Control Case, 102" Dual.	1,975.00	2,050.00

OFFSET CISTERN TYPE SCALE AND VERNIER PRICES

Scales, Single Linear Layout, per inch	$ 3.00
Scales, Special, Dual Linear Layout, per inch.	5.00
Scales, Dual, Linear and Non-Linear, per inch.	6.50
Scales, Special, Single Layout, Non-Linear, per inch	4.00
Scales, Special, Dual Layout, Non-Linear, per inch	7.00
Vernier, any common unit (with linear scales only)	26.00
Overflow Trap, P/N 215183-17 (32" Range)	135.00
Overflow Trap, P/N 215183-18 (62" Range)	142.00
Overflow Trap, P/N 215183-19 (102" Range).	151.00
Pressure Limit Control Cistern Shutoff or Solenoid Type Valve.	257.00
Counter Type Indicator, P/N 218585-1, 5 digit. (High Speed - Maximum 50,000 digits per minute)	230.00
Counter Type Indicator, P/N 218585-2, 6 digit (High Speed - Maximum 50,000 digits per minute)	265.00
90° Outlet Adapter for counter positioning, P/N 212474-1	103.00
212474-2	112.00
2 Outlet Adapter, P/N 219619-1	135.00

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OPTIONAL EQUIPMENT FOR MANOMETERS (CONTINUED)

Multiple Drive, 4 Outlets for use on Automatic Indicating Units to provide for additional indicators or accessories, P/N 210744-1.	$ 360.00
Lighting Kit, Scale, P/N 221875-1 -- 24 Volt.	47.00
221875-2 -- 6 Volt.	47.00
Pressure Vacuum, Generator Console - Includes Pressure Generator, Reference Vacuum Pump and Working Vacuum Pump, with necessary plumbing, wiring, and cabinet - 220660 Series	2,600.00
Valve Unit & Amplifier for Controller Manometers, 221415 Series	2,000.00
Controller System for DCNM Type Manometers, 223375 Series. (Must be factory installed.)	4,500.00
Null Indicator - Manual Manometers - Single Unit, P/N 221675-3.	335.00
- Dual Unit, P/N 221675-2.	625.00
Thermometer, -30° to 120° F., P/N 51200ABT (Replaces 51202)	7.00
-35° to 50° C., P/N 51250ABT (Replaces 51252).	7.00
Armor, for above thermometers, P/N 51720.	7.80
Level, 1 minute sensitivity, P/N 220964	12.65
Magnifier, Uncased Manometers, P/N 221870-3	50.00
Magnifier and Lighting Kit Combined, Uncased Manometers,	
P/N 221870-1 -- 6 Volt.	42.00
P/N 221870-2 -- 24 Volt	42.00
Stop Bar and Shift Mechanism, Manual and Pressure Controllers	252.00
Stops, for above installation, minimum spacing: 0.4"	3.00
Universal Temperature & Gravity Compensator - 32" Models.	400.00
- 62" Models.	490.00
- 102" Models	600.00
Gage Block Set, for calibrating DCNM-83 Series Manometers	P.O.A.
Vacuum Pumps, 1402B Working Vacuum.	450.00
8805B Reference Vacuum.	195.00
McLeod Gage, P/N K923000, Size A.	125.00
Momentary Valve, P/N 219385-3, Stainless Steel Body (Maximum working pressure 150 PSIG).	415.00
P/N 219385-5, Aluminum Body (Maximum working pressure 150 PSIG).	360.00
P/N 221850-2 (Maximum working pressure 1000 PSIG). . .	655.00

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OPTIONAL EQUIPMENT FOR MANOMETERS (CONTINUED)

O-Ring Kit for 10-A1-31 Barometer, includes all O-Rings for complete cleanup, P/N 223336	$ 20.00
Barometer Tube for 10-A1-31, P/N 221640-15	83.25
Barometer Tube with lapped-in check needle	105.75
Cistern, Glass, P/N 210419-1	42.25
210419-2	47.60
210419-3	49.65
210419-4	64.85
210419-5	49.65
210419-6	57.80

Replaces all previously published price sheets. Above prices are F.O.B. Cheyenne.
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